sea, a question which now seems to us out of date. We think, considering the object of his work, the author has made a mistake in filling up so much space with a comparison of opinions on these questions; he has done the same with the Gulf Stream and Ocean Current question, introducing large quotations from the well-known authors who have discussed it. We do not see that all this matter is quite relevant to the object for which the book has been published. The English readers, for whom the work must be meant, are already familiar with all that Mr. van Campen has brought forward, and so, we should think, are the Dutch readers who are likely to take an interest in the work. For both English and Dutch readers great compression would here have been advisable; and, indeed, we think the whole work might have been contained in one volume. All these conjectures as to the nature of the Polar region and the extent of the Gulf Stream seem to us waste of energy, as the only method of solution is to go and see. And this is what Mr. van Campen wants the Dutch to do. He also discusses the—to English readers, at least—somewhat threadbare question of routes, and with justice shows that the route for the Dutch is their old one by Spitzbergen or Novaya Zemlya. He thinks they might try either a route to the north-east by Novaya Zemlya somewhat on the traces of the Payer-Weyprecht expedition; or—and he seems to prefer this—they might make Spitzbergen a basis of operations, and with two ships establish a depôt, and by taking plenty of time, might in this way, partly by ship partly by sledge-boat, reach the Pole. Happily, however, Mr. van Campen does not hold up the Pole as the only and chief goal of Arctic exploration; he shows forcibly and fully the many great gains to science and humanity which are to be obtained by a perfectly equipped Arctic expedition. It would, we think, be fortunate both for the Dutch and for science if they could be persuaded again to occupy the field on which of old they reaped so much glory; and now that there is every likelihood of an international system of stations being established around the Polar regions, we cannot see that so important, though so small a nation, can any longer withhold itself from doing its share of the world's work in this matter. No doubt the Dutch have for long had much to do in looking after the affairs of their own household, but now there are signs that they have leisure and wealth enough to take a substantial part in cosmopolitan work. Mr. van Campen's arguments have already been brought under the notice of several prominent Dutchmen, and we think his object would be better served by the publication of a compressed Dutch edition, than it seems likely to be by this lecture read to the nation in the hearing of the English. "As certainly as the North Pole exists is it necessary to our command of the forces of nature, in the interests of mankind, that we should know in what way the ice and snow, the long nights and day, the tides and the geological formation of lands and islands about that mysterious summit of the Polar axis, react upon more favourable and fully inhabited climes. The *Alert* and *Discovery* have gone forth, then, at the call of England only, not to serve England only, but the entire world. And not less important, we may add, would prove a Dutch Arctic expedition for the service of science and mankind."

For English readers who want, in short space, to get a knowledge of the arguments in favour of Arctic exploration, of the discussion on the subject of the various routes, of an "open Polar sea," and the configuration of the unknown region, and on the question of ocean currents and the Gulf Stream, Mr. van Campen's first volume will prove useful. The second volume will, however, possess for us more of novelty and interest, as it will contain a history of Dutch Arctic enterprise. As there are no cuts in this volume, we presume Volume II. will be well supplied with illustrations and maps. We hope soon to have it before us.

OUR BOOK SHELF

Proceedings of the London Mathematical Society. Vol. VI. (London: Messrs. Hodgson, 1876.)

PROF. CAYLEY contributes to this volume several memoirs bearing on the theory of attraction. References to some of his earlier papers on the subject are given in Todhunter's "History." The titles of the present papers are "On the Potentials of Polygons and Polyhedra," "On the Potentials of the Ellipse and the Circle," "Determination of the Attraction of an Ellipsoidal Shell on an Exterior Point," "Note on a Point in the Theory of Attraction." The order of the papers will indicate the direction of growth the subject took in the author's hands. Mehler has treated of the attraction of polyhedra, but Prof. Cayley's results "are exhibited under forms which are very different from his, and which give rise to further developments of the theory." He finds general formulæ for the potentials of a cone and a shell, he then takes the case of a polyhedron or a polygon, obtains results for rectangular pyramid, rectangle, and cuboid, and verifies some of these results. The attraction of an indefinitely thin ellipsoidal shell was shown by Poisson to be in the direction of the axis of the circumscribed cone, this property was also demonstrated geometrically by Steiner. The geometrical investigation was subsequently completed by Prof. Adams so as to obtain from it the finite expression for the attraction of the shell, a result which had also been obtained analytically by Poisson. Prof. Cayley states the geometrical theorems, proves them, and obtains analytical expressions for the attraction of the shell and for the resolved attractions. The law of attraction throughout is that of the inverse square. The same writer also contributes a paper "On the Expression of the Co-ordinates of a Point of a Quartic Curve as Functions of a Parameter." This last is the development of a process of Prof. Sylvester's. Dr. Hirst's remarks on "Correlation in Space" are a mere abstract of results, a fuller statement of which is reserved for a future communication. Prof. Wolstenholme contributes a neat piece of analysis called "A New View of the Porism of the In- and circum-scribed Triangle." Prof. Sylvester contributes two interesting notes from M. Mannheim with reference to Peaucellier's cells and their application. The Rev. W. H. Laverty supplies an "Extension of Peaucellier's Theorem." Mr. Routh has a paper "On Laplace's Three Particles, with a Supplement on the Stability of Steady Motion;" Mr. Samuel Roberts contributes a paper "On a Simplified Method of obtaining the Order of Algebraical Conditions." This method is illustrated by various geometrical applications. Further papers of an analytical character are "On the Solution of Linear Differential Equations in Series," Mr. J. Hammond; "Note on some Relations between Certain Elliptic and Hyperbolic Functions," Mr. J. Griffiths; "Notes on Laplace's Coefficients," Mr. J. W. L. Glaisher. In mixed mathematics we have papers "On the Application of Hamilton's Characteristic Function to the Theory of an Optical Instrument symmetrical

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about its Axis," and "On Hamilton's Characteristic Function for a Narrow Beam of Light," Prof. Clerk-Maxwell; "On the Vibrations of a Stretched Uniform Chain of Symmetrical Gyrostats," Sir W. Thomson. The President (Prof. H. J. Smith) contributes papers "On the Higher Singularities of Plane-curves" and "On the Integration of Discontinuous Functions;" Major J. R. Campbell gives an account of "The Diagonal Scale Principle applied to Angular Measurement in the Circular Slide Rule." Shorter papers are "On the Method of Reversion applied to the Transformation of Angles," Rev. C. Taylor (the basis of the communication of which an abstract only is given in the "Proceedings," the full paper being printed in the *Quarterly Journal of Mathematics*, No. 53, is a work on Conic Sections, by G. Walker, 1794); "On some Proposed Forms of Slide Rule," and "On the Mechanical Description of Equipotential Lines," Mr. G. H. Darwin; and "On the Mechanical Description of a Spheroconic" and "a Parallel Motion," by Mr. Hart.

From this enumeration of the contents of the volume before us, it will be seen that its contents range over nearly the whole domain of pure and applied mathematics.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

The Government "Vivisection" Bill

ALLOW me supply an omission in the paragraph in last week's NATURE which states that Mr. Cross "pointed out" to the deputation on this subject, "that the Bill was framed practically in accordance with the views of the Royal Commission." This astonishing assertion was of course contradicted at once, but the fact does not appear in the paragraph in question; and, though the discrepancy between the Royal Commission Report and the Government Bill is notorious and acknowledged on all sides, so few people read either the one or the other, that a statement to the contrary may be believed, if allowed to pass. Those who have given attention to the Blue-book in question know that while the evidence on which Legislation was recommended went beyond the facts, the Report beyond the evidence, and the recommendations beyond the Report, the Bill actually introduced by Lord Carnarvon did not so much exceed as contradict the recommendations of the Royal Commissioners. If a reasonable registration Bill in accordance with the Report of their own nominees had been framed by the Government, they would have spared themselves and others a good deal of trouble.

P. H. P. S.

The Boomerang

I OBSERVE a letter in NATURE (vol. xiii., p. 168) asking for information about the "boomerang." I have now taken the occasion of a number of the aboriginal natives of this district being here with me for a time, to make inquiries on the subject which might confirm or correct my own previous observations. The information I have gained as to the "boomerang" I now condense, preserving, however, as much as possible the language made use of by my informant. I have also seen the boomerang thrown by one of their best performers, a short account of which I will add in conclusion to this letter.

Two kinds of boomerang are made, one called "marndwullun wunkun," that is the "boomerang," as I may translate the term "wunkun," which turns round; "marndwullun" is equally applied to the returning flight of a bird as to a boomerang. The second kind of boomerang is called "tootgundy wunkun," that is the boomerang which goes straight on, "toot" meaning something "straight" or "erect."

The two boomerangs differ in their construction. The second (straight) kind being thicker, longer, and less curved than the first, I shall call, as a matter of convenience, the "marndwullun" No. 1, and the "tootgundy" No. 2.

With No. 1 there is no certainty of hitting the mark. It may come back too quickly, and may hit your own friends standing near you. In choosing a boomerang like No. 2, in preference, it will be more sure to hit the object, and will generally penetrate the mark with the point which has been held in the hand. A black fellow will prefer one of the kind No. 2, if required for fighting. That is, he can make more sure of hitting his enemy. With No. 1 he will probably miss or even injure his friends, as it is difficult to tell where it will come back to. If No. 1 strikes an object it will never return; besides, it is generally too light to do much execution. These statements, which I have recorded as nearly as possible as given to me to-day, quite confirm my own observations made during the last twenty years in Victoria, South Australia, New South Wales, the Queensland Back country, and Central Australia. In Cooper's Creek I have seen boomerangs No. 1 used by the natives to kill ducks and birds in general which fly in flocks. They seemed unable to calculate where its course would be among them, and some were hit; the boomerang and the bird both fell. I have often seen these weapons thrown but never saw one return after striking an object. If slightly touching an object in its course, such as the small limb of a tree, it might continue a curve to the ground, but no longer in the same plane as before, and the impetus would be destroyed. A third kind of boomerang is used in Central Australia, as far at least as near to the tropics about the 141st meridian (north of Sturts Desert), which I think is only used for fighting at close quarters. Speaking from memory this variety is probably about 4 or 5 feet in length and of very heavy wood. I have rarely seen them carried, but have found them concealed near to or lying in the huts of camps from which the natives had fled at my approach. Finally, I have great doubt whether any of the natives can tell beforehand whether a boomerang No. 1 will, when finished, be a good "marndwullun wunkun" or not; and it is not uncommon for an aborigine, if he finds his boomerang to return instead of going straight to its mark, to heat it in the ashes and straighten it, so that the blade lies in one plane.

It may perhaps be not uninteresting to your correspondent if I record an instance or two in which the boomerang has been used in the settlement of quarrels in this district.

I write as follows, using the first person, and as much in the words of my informant as is possible:—

"Once I had a quarrel with one of our Kurni (black fellows). I was angry and called him 'barrat-dun.'[1] He was very cross. I had word from a friend that Daly was going to fight me. I was obliged to go, or be called 'jeeragan' (coward). A number of Kurni who had quarrelled had to fight each other at the same time.

"Our friends decided we were to fight with boomerangs. Both of us had 'tootgundy wunkun.' 'Marndwullan wunkun' would be no use, it is too light, and you can't take sure aim. Our friends stood round to see which was best man, just as I have seen the 'lowan' (white men) do. Daly threw the first boomerang because I had called him 'barrat-dun.' We threw turn and turn about. You can see the boomerangs coming. I dodged them as well as I could or turned them off with the shield. They passed me like a wind. I had a shield. If you turn the boomerangs they slide off. If you stop them they either break your shield or carry it away. One 'wunkun' passed me and stuck three or four inches into a dargan tree (Box = one of the Eucalypts). When the 'wunkuns' were all thrown we went towards each other with the 'culluck;' he put down the 'bamarook' (shield against the boomerangs or spears) and took up the 'turnmung' (shield against culluck = club). We had each a 'culluck' and a 'turnmung.' We both hit and warded off as I have seen white men do with their big knives (sword). At last Billy the Bull, one of our friends, ran in and cried out, 'moondanna' (that will do, or enough). Then we stopped. We were then friends. Daly said to me, 'Why did you call me that name?' I said, 'I am sorry.' There was no more.

"A few years ago 'Barny' woke up in his camp in the night and saw 'Lamby' standing by his fire. He was frightened, and said, 'What do you want?' Lamby said, 'Only some fire.' But Barny thought he had been 'ngarrat bun' (made sick). Perhaps it was with the 'yertung,' the little leg-bone of the kangaroo. If you point that at a sleeping man and sing a song he will be sick. I don't know the song, I never heard it; it might be, perhaps, beginning, 'Yertung, yertung, goombart, goombart.'[2] If he could do this without being seen the Kurni believe

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[1] Barrat = sickness or disease. The whole term implies having acquired a loathsome form of disease, for which the aborigines have to thank the whites.

[2] Goombart is the large leg-bone, and is ground down with a sharp point at each end and worn in a hole through the septum of the nose. It is believed to have magical powers.

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